

developed form may also be shown to exist,—or spiders, although it may be only a few species, have the power of changing their skins in the adult condition, which has not been observed hitherto.

I therefore examined one or two females from my collection which, according to external appearances, were mature. In none of them did I find an epigyne near the pulmonary opercula. On the 20th of October I again examined a *Filistata*, which apparently died during (the last?) ecdysis. This likewise had no epigyne at the usual place; but I discovered on the lower half of the ventral side of the abdomen, towards the spinnerets, a horizontal suture (“Fuge”), which was almost entirely covered by close-lying hairs. As I attempted to introduce a needle beneath the suture, which I had no difficulty in doing, the spider moved its legs (it was consequently not yet dead), and a drop of clear viscid fluid showed itself at the suture, receded again, and again issued forth when I exerted a little pressure. Can this have been a mass of germ-cells from the ovary? I have not examined the parthenogenetic female, since it is valuable to me for further observations, and I was afraid of injuring it; it is still alive at the present moment (February 1893).

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VIII.—*On a Medusa observed by Dr. Tautain in the River Niger at Bamakou (French Soudan).* By M. JULES DE GUERNE\*.

THE Société Zoologique is indebted to M. Gaston Tissandier for the first intelligence of the interesting circumstance detailed below.

In consequence of an article, accompanied by three figures and giving a *résumé* of R. T. Günther's paper on the Medusa of Lake Tanganyika †, published by me in ‘*La Nature*’ ‡, the courteous editor of that journal received a letter from Nouka-Hiva (Marquesas Islands), which he hastened to communicate to me. The letter bears the signature of

\* Translated from the ‘*Bulletin de la Société Zoologique de France*,’ t. xviii. (séance du 28 novembre, 1893) pp. 225–230: from a separate impression communicated by the Author.

† R. T. Günther, “Preliminary Account of the Freshwater Medusa of Lake Tanganyika,” *Ann. & Mag. Nat. Hist.* ser. 6, vol. xi. pp. 269–275, pls. xiii. and xiv.

‡ J. de Guerne, “*La Méduse du lac Tanganyika*,” *La Nature*, June 24, 1893.

Dr. Tautain, a distinguished anthropologist and an excellent observer, who is well-known on account of his travels in the French Soudan and in Bélédougou, and who was formerly medical officer to the Galliéni Expedition, and is now colonial administrator of one of the most distant archipelagos of the Pacific.

The following are the principal passages in Dr. Tautain's communication, written from Taiohae (Nouka-Hiva Island), 30th September, 1893:—

“In the issue of ‘La Nature’ for June 24, 1893, I observe, under the signature of M. Jules de Guerne, an article on the subject of freshwater Medusæ, with reference to the Medusa of Lake Tanganyika.

“It is stated by M. de Guerne that this species is the third freshwater Medusa that has been recorded. I believe that I am acquainted with another.

“In the month of January in the year 1888, at low water, I found in the Niger near Bamakou, in the still water at the edge of the river above the rocks of Sotuba, a Medusa which appears to me to be different from that of Lake Tanganyika. If my memory serves me, the diameter of this Medusa is from 20 to 25 millim.

“On the day when I noticed it I busied myself in collecting a certain number of individuals, and in a short time I had some fifty specimens of it in a bottle.

“On my return to Bamakou I endeavoured to preserve these Medusæ, in order to bring them back to France; but the various methods which I employed, the only ones that I had at my disposal, miscarried, and after the lapse of a certain time, varying according to the different methods, I had nothing left. It was my fixed intention to return to Sotuba to make a fresh collection and attempt other systems or combinations of systems of preservation, but I was unable to do so.

“The distance between the habitat of the Medusa of the Niger and the sea is considerable, and it must be remarked that the number of rapids (besides those of Sotuba) between Timbuctu and Boussa renders communication with the ocean very difficult for a creature of the nature of a Medusa.”

It is a matter for regret that Dr. Tautain did not think of at once making a sketch of the animal in question. Its dimensions would certainly have enabled him to recognize with a simple lens, or even to see with the naked eye, certain details of structure, according to which it would have been possible to form a correct idea of the organism.

The animal is, in all probability, a Hydromedusa of a

somewhat larger size than the three forms already recorded as existing in fresh water\*. As a matter of fact the largest specimens of *Limnognathia tanganyikai* (*sic*), Böhm †, measure 22 millim., while the diameter of *Limnocoelium Sowerbyi*, Allman and Ray Lankester, amounts to 8 millim., and that of *Halmomises lacustris*, von Kennel, only to 2·5 millim.

The fixed polypes of a creeping Hydrozoan of marine origin progressively adapted to fresh water may, in the course of centuries, ascend a river like the Niger, and even surmount its rapids. Without speaking of the changes which may have supervened in the configuration of the country, and of the accidental transport of débris of all kinds to which the animals with which we are dealing readily attach themselves, it is necessary to pay particular attention to the peculiar conditions affecting the river.

This is not the place to enter into lengthy considerations of geographical questions. I may be permitted, however, to quote a few passages from the great work by Elisée Reclus ‡, which will show, without requiring any comment, how a freshwater fauna is able to disseminate itself with great rapidity through a very extensive region, both up and down a river-system.

“United to each other to the south of Ségou Sikoro two large rivers flow parallel to the Niger; then, after breaking up into pools (*marigots*), which convert the Jénneh country into a labyrinth of islands, the common current rejoins the principal stream above Lake Debo. At this spot the waters, which are broad and very deep, are almost stagnant: a dam a few metres in height would transform the confluent into an inland sea; at the time of the falling of the waters the lacustrine reservoir spreads out on all sides, *even flowing up stream towards the upper river*.”

“Below the region where the liquid volume of the two Nigers in some places unites into lakes, and in others ramifies in tortuous arms around low islands, the stream, retarded by

\* I purposely omit to recall to mind here all the instances of Craspedote or Acraspedote Medusæ (*Crambessa*, *Callirhoë*, *Laodice*, &c.) which have been recorded as non-marine. I have spoken elsewhere of the majority of these (J. de Guerne, “Méduses d’eau douce et d’eau saumâtre, d’après quelques travaux récents,” Bull. scient. du dép. du Nord, 1880). Neither are the Coelenterates which live in what is almost fresh water in numerous localities of the Baltic and of the Gulf of Finland enumerated here.

† This is how, according to the rules of nomenclature, the name of the Medusa of Lake Tanganyika ought to be written.

‡ Elisée Reclus, ‘Géographie universelle, XII. Afrique occidentale,’ p. 52.

the obstacles of its banks, spreads out into a labyrinth of 'marigots,' which penetrates south of the major current to a distance of 150 kilometres into the interior. During seven months of the year this district of marigots, which extends to the south of the river, below the meridian of Timbuctu, is cut off from free communication with the Niger: there is nothing to be seen but scattered lakes, pools of stagnant water, obliterated channels, dead water, and damp hollows filled with reed-beds; but the river-floods, which overflow in a lateral direction along depressions in the ground, transform these into a network of flowing streams, and during four or five months large boats can be navigated freely in an immense maze of lakes and channels, in which the currents change without apparent rule, according to the force and the direction of the winds, the abundance of rain, or the heat of the sun. In this part of Central Africa nature assumes an aspect which resembles in certain respects that of Sweden, with its lakes of every variety of form, its creeks, its firths, and its rivers. . . . .

" . . . . . In one channel the water is open and deep, unimpeded by vegetation; in another it is encumbered with weeds, through which it is difficult for boats to force a passage, and which occasionally become detached in the shape of floating islands, which eventually form barriers at the bends of the stream which are impassable for boats: every year traders are compelled to change their route through the tortuous intricacies of this vast labyrinth. . . . ."

But even if we exclude the possibility that the higher waters above the rapids may be reached at last in an indirect manner by means of the floods, the rapids themselves might still be directly surmounted by the Hydroids; for it has been found at Hamburg that the water-mains are invaded by colonies of *Cordylophora lacustris*, Allman, which develop there in all directions in spite of the intensity of the current\*. Besides, if the actual rocks in the torrent do not furnish these animals with a base upon which to grow, they will attach themselves to dead or living shells†. This is the habit of

\* Kraepelin, "Die Fauna der Hamburger Wasserleitung," Abhandl. a. d. Geb. der Naturwissensch., herausg. v. Nat. Verein Hamburg, ix. 1886, pp. 5, 6. Allman had previously recorded the presence of *Cordylophora* in the water-mains of London (Allman, 'A Monograph of the Gymnoblatic or Tubularian Hydroids,' Ray Society, London, 1871-72, p. 253).

† It has long been known that *Cordylophora lacustris* is frequently met with upon the shell of *Dreissena polymorpha*, Pallas. In this situation it was found in Paris itself, in the great reservoir of the Jardin des Plantes (E. Perrier, "Sur l'existence à Paris du *Cordylophora lacustris*, Allman," Arch. zool. expérim. ii. 1873, Notes et Revue, p. xvii).

Bryozoa, whose mode of dispersal is not without analogy to that of Hydroids. Their colonies or their statoblasts are frequently met with upon the shells of mollusks, not only upon stationary or slowly-moving bivalves, but upon Gastropods like *Paludina*, which are very well able to crawl against the stream\*.

A few months ago, when Dr. Meissner was examining the specimens of *Ætheria* in the Berlin Museum, he recognized upon their shells statoblasts of *Plumatella* †, thus placing beyond doubt the existence of these Bryozoa in the great rivers of Africa (Nile, Senegal, and Niger), although they were for a long time not to be found upon the Dark Continent, and were so difficult to discover that a naturalist so able as Stuhlmann declares that he searched for them in vain for two years and a half ‡.

*Ætheria*, masses of which form in great rivers accumulations comparable to oyster-beds, and which, like the latter, resist the action of the water, furnishes an excellent basis for

\* I append a few instances of freshwater Bryozoa attached to Mollusca:—Upon the shell of an undetermined species of *Unio* Leidy discovered at Philadelphia the curious *Urnatella gracilis*, while upon *Unio delphinus*, Lea, *Symphinota bialata*, Lea, and *Anodonta securiformis*, Say, Jullien found *Norodonia* from China and Cambodia. The same naturalist records the occurrence of statoblasts of *Plumatella* upon specimens of *Unio* collected by M. Chaper in the Madras Presidency. *Pectinatella Carteri*, Hyatt, and *Hislopia lacustris*, Carter, have been likewise met with in India upon *Paludina bengalensis*, Lamk. (J. Jullien, "Monographie des Bryozoaires d'eau douce," Bull. Soc. Zool. de France, x. 1885, *passim*). Kraepelin, moreover, has given some extremely interesting details as to the veritable *symbiosis* which appears to exist between *Plumatella princeps*, Kraep., var. *spongiosa*, Kraep., and *Paludina fasciata*, O. F. Müller. In the Bille and in the Elbe, in the neighbourhood of Hamburg, thousands upon thousands ("Tausende und Abertausende") of *Paludina* are found covered with *Plumatella*, and resembling in consequence so many potatoes rolled about by the water. It is a remarkable fact that in these localities scarcely a trace of the Bryozoon in question is seen upon submerged stones. Moreover the *Paludina*, in burying themselves in the mud to hibernate, ensure the preservation of the statoblasts with which they are covered, and which they also bring back to the surface on the return of spring, at the period of development (K. Kraepelin, "Die Deutschen Süßwasser-Bryozoen," Abhandl. a. d. Geb. der Naturwissensch., herausg. v. d. Nat. Verein Hamburg, x. 1887, p. 121 of the separate impression, pl. iv. figs. 113 and 114).

A number of exotic fluviatile mollusks, and especially the large and small species of *Anypullaria*, which are so widely distributed in hot countries, should be examined from the point of view here considered; I am not aware that this has ever been done.

† Meissner, "Beitrag zur Kenntniss der geographischen Verbreitung der Bryozoengattung *Plumatella* in Afrika," Zool. Anzeiger, xvi. p. 385.

‡ F. Stuhlmann, "Fauna von Ost Afrika," Sitzgsber. Gesellsch. naturforsch. Freunde zu Berlin, 1890, p. 184.

the development of colonies of Hydroids\*. Can it be a matter for surprise that the latter, which are doubtless of very small size, have never been seen and may still long remain unnoticed, if we reflect that the statoblasts of which we have been speaking are quite a recent discovery, and, above all, that, in spite of continual watching, it has taken nearly *five years* to find in London itself, with all the resources of a perfectly equipped laboratory, a hydroid phase of *Limnocoodium*? †

IX.—On the Development of the Fins of Teleosts.

By ROSS GRANVILLE HARRISON †.

EXCEPTING the Elasmobranch Fishes, we have no complete knowledge of the development of the extremities of any group of vertebrates. The skeleton alone has received due attention. The muscular system of the limbs of the higher vertebrates has been supposed by recent writers who have touched upon the subject to take its origin from masses of cells derived from the myotomes. These myotomic cells are in a general way to be regarded as homologous with the cells of the muscle-buds ("Muskelknospen"), out of which the

\* The oyster-beds at certain points of the coast are justly regarded by zoologists as exceptionally rich localities. I have mentioned a very typical example of this lying off Dunkirk. Sponges, Hydroids, various Annelids, Bryozoa, and Cirrhipedes, to speak of fixed animals alone, multiply upon the dead or living shells with singular vigour, and this in spite of the violence of the gyrotory currents, which in these parts may attain a speed of two metres a second (J. de Guerne, "La rade de Dunkerque," *Revue Scientifique*, March 11, 1885).

† A. G. Bourne, "On the Occurrence of a Hydroid Phase of *Limnocoodium Sowerbyi*, Allman and Ray Lankester," *Proc. Roy. Soc. Lond.* xxxviii. p. 9. It will be remarked that the basin in Regent's Park in which the Medusæ have appeared at intervals, and where the hydroid phase of *Limnocoodium* has at last been discovered, has been emptied and left dry for a somewhat long period on several occasions. This appears to indicate on the part of this freshwater type a singular power of resistance to the most abrupt changes in the condition of the medium. *Vide* the plate, p. 12 *loc. cit.*

While correcting the proofs of the present note I have received no. 1258 of 'Nature' (Dec. 7, 1893), containing an article by Prof. Ray Lankester entitled "Reappearance of the Freshwater Medusa (*Limnocoodium Sowerbyi*)." This organism, which had not been observed again in London since July 1890, has unexpectedly come to light at Sheffield in a tank containing aquatic plants sent from Regent's Park.

† From the 'Johns Hopkins University Circulars,' No. 111, May 1894, pp. 59-61: being a preliminary communication.